In Chapter 1 we introduced a computer as a machine that is capable of storing and processing large amounts of information very quickly. We saw that the operations that computers perform on the information that they process are usually very simple (limited to simple arithmetic and logical operations) but can be performed at very high speeds. We also saw that it is possible to write a program in the C# programming language and run that program on most computers. Chapter 1 left one very important question unanswered – how is a C# program translated into instructions that the underlying computer can understand so that it can be executed?

In this chapter we will look in more detail at the components of a typical computer and how they work. Hopefully, this will allow you to understand in detail what’s involved in getting a program written in C# to actually execute on some computer!

The Components of a Typical Computer

Figure 2.1 illustrates the components of a typical desktop computer system. The computer in question might be a typical PC, an Apple Macintosh, or a workstation used for computer-aided design or scientific computing. In fact, I have examples of all three of these types of computer sitting in my office! The most striking thing about them is that, although they all have different capabilities, they all have more or less the same basic components:

- a monitor on which information is displayed
- a keyboard and mouse used to input information
• a cabinet – usually referred to as the system unit – containing the computer’s central processing unit (CPU), or processor, and its primary memory, as well as additional secondary storage devices such as hard disk drives, CD-ROM drives, and floppy disk drives.

In some cases, extra storage devices such as additional hard disk drives or CD-ROM drives may be provided outside of the system unit to which they are then attached in much the same way as the monitor or keyboard. Other devices that may be attached to a typical desktop computer might include joysticks, modems (a modem is a device used to interconnect computers via the telephone system), or printers. Taken together the entire collection of components that makes up the computer system is often referred to as being the computer’s hardware (as distinct from its software, which consists of the collection of programs provided with the computer system).

While the input and output devices (including the storage devices) attached to a computer are its most visible components, the heart of any computer system is its processor and the associated electronic components including the computer’s primary memory and so-called peripheral interfaces. These components are usually to be found on a printed circuit board (PCB) housed inside the system unit and often referred to as the computer’s motherboard. These components are implemented as small electronic devices, usually referred to as integrated circuits or chips. Figure 2.2 illustrates the components to be found on a typical motherboard.

While a computer system that is embedded in a machine such as a video recorder or motor car will probably not have a monitor or keyboard, and may not even have any secondary storage devices, it will certainly have a PCB containing a processor, some memory, and one or more peripheral interfaces. In this case, the peripheral interfaces are required to allow the computer to interact with sensors or valves that control parts of the machine in which the computer is embedded.

**The Processor**

The processor is the component of a computer system that actually executes instructions. Every computer system has a processor. In fact, some computer systems may have more than one processor, although this is still relatively rare. Typically, the processor contains no memory (other that a small set of memory cells called processor registers that are used as a kind of scratch pad while executing instructions). Hence, when running a program, the processor repeatedly fetches its instructions from the memory, decodes them, and carries out the specified operation as illustrated in Figure 2.3. This process is usually referred to as...